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**ELEVEN CASES
ROENTGENOGRAPHIC AND OPERATIVE FINDINGS**

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ROENTGEN INTERPRETATION OF INTESTINAL CONDITIONS

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In Roentgen examination of the intestinal tract it is essential that both the Roentgenoscopic and Roentgenographic method be employed. There has been much discussion of the dangers to the examiner when using the former method. That this danger exists must be admitted, even with improved protection, but it adds so materially to the accuracy of findings as to be indispensable. Roentgenographic methods will give a greater percentage of failures in intestinal diagnosis than will occur in any findings on other portions of the body, if adhered to alone.

The lack of uniformity in arrangement of intestinal structures, and the wide variations even in the normal types are so great as to lead to the most irrational interpretations even when we employ every method that has been enumerated by our best Roentgenologists, when the attempt is made to adhere to the X-Ray plate in intestinal examinations.

As a matter of economy, diagnosticians are attempting intestinal findings with the Roentgenoscopic method alone, perhaps taking one plate as proof that an examination was made. That the visualization of intestinal structures by opaque salts is alone sufficient to determine conditions is not true, can be easily proven by anyone undertaking this work on a sufficient scale to establish conclusive proof.

While defects, as extensive ulcer of the duodenum, are visible under the fluoroscope, a small ulcer cannot be seen, though we may get repeated plates of a duodenum with evidence of ulcer, and while palpating and inspecting with the fluoroscope no tenderness is found, the intestine may be held in a fixed position by adhesions that will account for any deformity. A terminal ileum may appear normal on a plate, though when manipulated properly will demonstrate an ileal kink. An appendix may be covered by the cecum, and the hand of the examiner will readily displace the cecum sufficiently to render it a very conspicuous object in the fluoroscopic field. Many cases of adhesions of the colon can only be diagnosed by manipulative methods while examining the part.

Much has been said and written concerning intestinal ptosis, and the harm resulting therefrom has been regarded as the cause of many unfortunate conditions, perhaps capable of repair. In my opinion, simple ptosis is without harm and does not interfere with intestinal function, although it may influence the welfare of other viscera. The stomach may lie in the middle of the pelvis, but if the pylorus and duodenum are descending with it, the drainage will be satisfactory and the function still maintained. If incomplete ptosis exists, by which I mean the suspension and fixation of certain sections of the intestinal tract at such a high

level above adjacent portions of the intestine as to produce acute flexures, great harm usually will result.

A determination of the fixation points in the intestines, the amount of obstruction produced, and the secondary organic changes, either of inflammatory or evolutionary development, can best be made by manipulation of the parts while observing them under the fluoroscope now. When these conditions have been so determined, a satisfactory record can only be made on an X-ray plate, and this while maintaining the parts in such a position as to demonstrate the presence of the defect or deformity.

The technique of operators varies greatly, but I wish herein to outline briefly the main points in my own methods as applied to a determination of mechanical deformities and organic changes in the intestines which are made by the X-ray. When examining the intestine the usual stasis test is given, consisting of a bismuth meal in a suitable suspending medium consisting of four to six ounces of bismuth subcarbonate, the amount depending on the relative size of the patient. The quantity may appear excessive, but I am convinced that this amount gives a better reading because of the greater density of the shadow and better distribution. As I make a practice of continuing a patient on a normal diet and withdrawing all cathartics and laxatives for a number of days before the examination has begun, the larger amount of bismuth is very apt to be well diluted by recent food, and unless of sufficient quantity, may give a faulty reading.

Cases presented for examination should always be tested while living under normal conditions and partaking of normal diet. By pursuing this practice, we arrive at a conclusion as to the real power of the alimentary canal to do its work; if artificial stimulus of any kind is employed, inaccuracy can only result. It is a well-known fact that a thorough cleansing of the bowels will improve the function of the organ for an indefinite period, and tests under this condi-

tion will always lead to a false finding on stasis.

I examine the patient at six hours after the administration of the meal, the engagement being made for five and one-half hours after the meal to allow for delays and preparation. When the findings are near normal, the case is examined at the sixth, eighth, ninth, thirtieth, fifty-fourth and seventy-eighth hour. If there is a marked gastric delay the ninth hour may be changed to the tenth or twelfth, or if there is convincing proof of a pyloric or duodenal stenosis, the last examinations are omitted that day and a second test made at a later date, during which various manipulations are undertaken to determine the completeness of the obstruction. If the gastric delay is marked, a true reading of intestinal delay is difficult for two reasons: First, it prevents determination of actual time consumed in the intestinal progress; second, sections of the intestine will not contain enough bismuth to cast a good shadow; this is especially so in an examination of the terminal ileum.

If it can be avoided, the patient should not be permitted to lie down between the taking of the meal and the eighth hour thereafter, except for the very brief time necessary in the sixth hour examination, for if the delay is due to a kinking of the duodenum, this will be corrected by the upward displacement of the stomach in the horizontal position and the stomach contents will be discharged very rapidly; or a duodenal delay, a result of kinking at the junction of the duodenum and jejunum will be overlooked, because this deformity will be also corrected and the duodenum permitted to empty.

Should I find evidence of delay in the stomach or duodenum during the stasis test, I do not attempt to determine its exact character until the second meal, but take up each section of the intestine from the lower ileum downward as they fill with sufficient bismuth. The terminal ileum is examined between the sixth and ninth hour after the

meal, if it contains sufficient bismuth; otherwise, this portion is also examined after the second meal. When examining the terminal ileum, it should be sufficiently isolated from other ileal coils to give it a clear field, and if this is impossible, we are forced to wait until the other coils of the intestines are empty. In manipulation of the ileum the first act is to push the cecum up, then apply pressure between the cecum and ileum and endeavor to separate them; the terminal ileum is then moved from side to side and its motility determined. At the same time several sections may be manipulated upward and downward; pressure is then applied just above the cecum to force it downward to the position assumed while in the erect position; this will kink the ileum, if an ileal band or contracted mesentery exists close to the ileo-cecal valve. Frequently ileal bands involve the parts adjacent to the pelvic brim; these can be determined by manipulation of the ileum at this point.

A determination of the appendix of necessity is best made when this organ is filled with bismuth, but frequently in a thin subject, we may palpate it when but a small portion of the appendix is visible. The appendix very frequently will not fill while the ileum retains sufficient bismuth to outline it. My experience has taught me that the appendix is most apt to fill after a large enema has been given, and appendices that do not appear during the stasis test are most always found twenty-four hours after the administration of the enema to contain a surprising quantity of bismuth; this has enabled me frequently to locate an appendix that would ordinarily escape inspection. The explanation I have for this, is that the organ was filled with feces that prevented the entrance of the bismuth. An enema dislodges this, and permits the entrance of the bismuth that has already been administered by mouth at the same time the enema was given.

Of a large number of cases that are examined for the appendix alone, I never failed to find some portion of it filled with

bismuth. One case, which at operation was found to have almost the entire canal obliterated, when inspected by the fluoroscope previous to the operation contained bismuth in about one-half inch of its proximal portion.

The examination of the appendix, cecum and terminal ileum involves careful manipulation, but with a trained hand this can be done in a very few seconds. I am usually able to do this within five seconds, but to be sure, this does not mean that an entire determination is made in this time, but the portion of intestine that is examined at each visit is that part which is best filled, and we need not examine all these sections each time the patient is on the table. The mobility of the cecum is readily determined, unless lodged in the pelvis, but by careful watching over several days, we may make it unnecessary to attempt to dislodge the cecum from the pelvis. My usual practice is to allow sufficient time for the cecum to empty and contract, which will draw it up out of the pelvis, or the administration of an enema may distend the rectum and push it upward. Digital pressure from below may be employed when justifiable, in the endeavor to ascertain whether the cecum may be dislodged or not.

With regard to the determination of the cause of colonic obstruction, manipulation under the fluoroscope during the passage of the bismuth meal is the most valuable procedure; this is superior to manipulation following the administration of an enema, providing the various sections of the colon retain sufficient amounts at the time of the examinations. Ingested bismuth is usually in the more solid state in the colon than the enema, therefore much better manipulation can be followed. Attempts to determine adhesions when the colon is distended by the very fluid enema, in addition to the added rigidity of the abdomen from abdominal distension, render it very deceptive, and should not be given much credit.

Examination for bands, adhesions, and membranes involving the ascending colon, as well as other sections of this portion of

the colon, is done by such manipulative methods as are obviously necessary to separate and move the folds and coils about. Mesenteric bands in many cases are so buried in the wall of the intestine between the haustrations, that we can only find them by deep palpation which will separate these segments. If we find these constricted fixed points, and at the same time observe delay at this place, we are safe in assuming that such conditions exist. Erect position may bring out the acute angle that is formed where the band has fixed the gut, the splenic flexure at deep inspiration may force the colon down so that the angulation is made manifest.

If during the statis test, delay not directly traceable to pyloric obstruction was found, the duodenum is inspected, especially at the juncture of the first and second portion. To do this a meal is administered with the patient in the erect position, then sufficient time is allowed for it to reach the duodenum; it is now watched under the fluoroscope as it passes from the stomach. The conus-duodenalis will fill promptly, especially if gastric peristalsis is active. If the gastric motility is slow, more time is allowed. After the first portion of the duodenum is filled, if none escapes into the second portion or if it passes through excessively slow, the stomach is elevated by moderate pressure just below the greater curvature, and if there is a kink at this place, the tension is relieved by the upward pressure, and progress of the duodenal contents is uninterrupted. The patient is then placed in the prone position, the stomach permitted to drift upward, and the advance of the bismuth through the duodenum watched by the fluoroscope, posteriorly. The patient is then turned to the supine position, first lying on their right side in order to fill the pyloric end of the stomach. The progress through the duodenum is watched for a moment, and the patient is asked to take a deep inspiration; this will force the duodenum downward with the liver, so that the fingers may be pressed in above it, and when the

lungs are emptied and the liver is carried upward, the duodenum also will be pulled upward if fixed, whereas if not adherent or retained by a band, it can be easily held down by moderate pressure. At the same time the degree of tenderness may be determined.

Kinking at the duodenal-jejunal juncture may be difficult to find, but by filling the duodenum with pressure upward on the stomach, then rotating the patient to the left, the amount of retention in the duodenum should tell us the degree of obstruction.

If we inspect the intestines in the vertical position, at varying periods and under different conditions, we find marked changes in the degree of ptosis. The factors that enter into this are the quantity and position of the intestinal contents. In general it may be said that the higher in the abdominal level the accumulations are, the greater degree of ptosis. A distended rectum and pelvic sigmoid will push the ileum upward, and under certain conditions, will also carry the cecum up. If the ileum is filled with gas or feces, the transverse colon and stomach are elevated; if a mobile cecum is loaded, it is very apt to be found in the pelvis because of the wedge-shape of this structure, but if empty, will contract and retreat to its normal position. If the cecum is above the brim of the pelvis, and the rectum is distended with feces, a Lane band may not obstruct the terminal ileum, that is, providing this band does not fix the ileum too securely to the posterior wall. If a cecum rests in the pelvis, and there is no obstructing ileal band, even with a patulous ileo-cecal valve, there will not be ileal stasis because the contents of the terminal ileum is then favored by gravity. When a recent meal fills a mobile cecum, and it drops into the pelvis, and a redundant sigmoid becomes filled with inspissated feces, it will so wedge the cecum in the pelvis as to render it almost immovable. I have observed this condition produce very marked distress and have seen immediate relief extended to the patient by

forcing the cecum upward into the abdomen. This has only been observed as an accident, occurring in the course of an examination in three or four cases.

The great omentum may be adherent in the lower abdomen or the pelvis, in such a way as to hold some section of the intestines securely in an abnormal position, and so simulate adhesions of this special section of the gut, as to give us a wrong reading. One case examined by me, in which I reported probable adhesions binding the left transverse colon in the left iliac fossa, was found at operation to present a dense fibrous band extending from the left lateral abdominal wall downward and inward to the pelvic structures, making a pocket between it and the posterior pelvic wall, in which the transverse colon was wedged and was only elevated after severing the bands. No adhesions of the transverse colon existed.

The so-called "Jackson's Membrane" and other evolutionary membranes and bands, and what I generally designate a contracted meso-colon, are best found by manipulation in conjunction with the fluoroscope in the vertical and horizontal position. Mesenteric bands and contracted mesentery have a predilection for forming at five places, which are: just above the cecum on the ascending colon; a short distance from the hepatic flexure; a few cm. below the splenic flexure; at the juncture of the descending colon with the ileal sigmoid; and at the juncture of the iliac and pelvic sigmoid. They may occur at other places, but the above-mentioned points are where they are most commonly found. Those just below the splenic flexure are frequently located by the patient taking a deep inhalation, which forces the splenic flexure downward, so that the drag is placed upon the fixed point. At other places they are best determined by manipulation.

I am convinced that Nature has established certain compensatory phenomena that equalize the material supplied the intestinal

tract, and by that, tends to prohibit the reception of more material after a safe amount has been received, and that the quantity is dependent on the power of any special portion to digest the amount therein. I believe that pyloric spasm is partly due to a protest against more food entering the intestine after a given amount has proceeded, and that a spastic state at any point, is an attempt to regulate the amount ingested by the digestive system. Modification of this inhibitory function occurs when abnormalities develop, such as the intense spasmodic waves of peristalsis in the duodenum and ileum, the occasional isolated contraction in the upper half of the colon, and the intense spastic state of the lower half of the colon, which is commonly seen accompanying abnormal appendices, ileal kinks, and various adhesions.

Of the many cases I have examined, I have never had convincing evidence of reversed peristalsis; certain phenomena do occur following the administration of an enema, which may be looked upon as peristalsis carrying the intestinal contents backward. Careful observation will quickly show us that this is not due to a constriction of the colon below the material which is moving upward, but is simply a backward flow, passive in character, which occurs when expulsion is prohibited and the bowel relaxes above. I have seen two cases in which there was proof of the ascension of material that had been ingested. In one of these, the return had been from the lower colon to the cecum and in the other on the sixth day following the first bismuth meal, and after all was in the colon, there was a return as far as the duodenum. They were both cases of extreme atony, the entire organism being in a state of exhaustion.

Should the colonic contents become very fluid as the result of downward flow of a large quantity of the ileac feces, it can readily be seen that the bismuth mass could be disintegrated sufficiently to drift upward, the same as witnessed following an enema.

CHRONIC INTESTINAL STASIS—FLUOROSCOPIC AND X-RAY DIAGNOSIS IN THE LIGHT OF OPERATIVE FINDINGS—WITH ILLUSTRATIVE CASES*

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A distinguished pathologist, in discussing the work and views of Sir W. Arbuthnot Lane with reference to chronic intestinal stasis, asks the question: "Is Sir Arbuthnot Lane justified in his teachings, or is he the victim of an obsession?"

"If his teaching be false it will die," says another, "if it be true it will form a landmark in the surgery of the twentieth century!"

Again, after having verified many of Lane's findings, another of his countrymen announces that he is "travelling hopefully."

From indifference to ridicule, from curiosity to earnest attention, the majority of surgeons who have given ear to Lane's views at all, have passed. A few have persistently followed his lead, and have sincerely endeavored to test his theories by actual experience, believing from the first that he had opened up a new and fruitful field of endeavor. Internists, gastro-enterologists, surgeons, and Roentgenologists have united in the determined effort to decide whether these teachings shall die, or whether the surgery of the twentieth century shall be revolutionized, in a measure, in accordance with Lane's views.

In this general effort the Roentgenologist has played a conspicuous part, and has rendered valuable service in the matter of making and verifying diagnoses. The splendid work of Jordan, in this connection, is doubtless familiar to all. It has served, in a measure, as a model for others who are working in this difficult field—for it cannot be denied

that the gastro-intestinal tract is a difficult field for radiologists. How well they have succeeded has been expressed recently by members of this specialty, as follows:† "It was the X-ray used after the administration of a bismuth meal, that finally unlocked the door to a positive and scientific knowledge of the action of the alimentary canal." They also quote the familiar statement from Keen's System of Surgery (Sixth Edition): "The actual size and shape of the stomach, as known to the pre-roentgen anatomists, or its motor functions and peristaltic activity, as known to pre-roentgen physiologists, were almost as inaccurate as the map of Europe before Columbus proved the earth was spherical. The Roentgenologist who has repeatedly watched the behavior of a bismuth meal in its passage through the alimentary canal has a far more accurate idea of the normal processes of digestion than had the best pre-roentgen clinician."

Such statements apply, with absolute justice, to radiographic work of high quality. X-ray and fluoroscopic examinations carefully executed and properly interpreted, are of great value, and surgeon and Roentgenologist should co-operate in increasing skill in execution and interpretation. For it is equally true that unless radiographic examinations of the alimentary canal be made with an accurate understanding of the requirements of this particular part of the anatomy, and unless they be intelligently interpreted, they are of practically no value, and the surgeon who depends upon them for a guide as to whether to operate or not to operate will find himself falling into many difficulties.

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†Boggs and Foster, *International Journal of Surgery*, April, 1914.

Undoubtedly the most expert work accomplished in this direction is that of Alfred C. Jordan, of London, who has been associated with Sir Arbuthnot Lane in so much of the latter's investigation of the subject of chronic intestinal stasis. Jordan's success in this line has been attributable in large measure to the fact that he has gone over his plates, made before operation, at the operating table, comparing step by step his fluoroscopic and radiographic findings with conditions actually found during operation. By checking up his errors in this way he has been able to better guard against them. He has thus developed the ability to make negative as well as positive diagnoses. Those who, like Jordan, are willing to devote the time and patience required in this checking-up method, will find a certain sense of security in their work that it must be difficult to acquire by confining one's effort to the X-ray laboratory. Such work, I fancy, will dispel forever the possibility of our following the will-of-the-wisp which the distinguished pathologist (Adami) has inferentially designated an obsession.

However, it is not the purpose of this brief communication to discuss the merits or demerits of Lane's theories concerning chronic intestinal stasis. I think we may dismiss, for the present, as proved, his contention that adventitious bands *do* form about certain portions of the gastro-intestinal tract, that they may cause kinking of the gut at points of fixation, and that the immediate result of this state of affairs is often a slowing of the contents of the great drainage canal,—a condition to which he has applied the term chronic intestinal stasis, with a long chain of symptoms which can be best explained by a toxic condition resulting from an absorption of poisons from the intestinal tract. If there is still a doubt in the minds of those who are studying the matter, I feel sure that the checking-up method of study alluded to, in which surgeon and radiologist co-operate at the operating table, will go far toward dispelling such doubts.

It is necessary, first, however, for both surgeon and radiologist to understand perfectly the mechanics of the great drainage scheme of the body. All this has been so clearly detailed in papers by Lane and his students that I need not take the time here to discuss the matter. One point, however, I wish again to reiterate, namely, that in searching for kinks in the gut it must be borne in mind, by radiologist as well as surgeon, that there is a difference in the relationships of the intestines when the patient is in the erect and in the prone position upon the back. In the upright posture there is, as all know, a tendency to a greater or less degree of general ptosis of the hollow viscera, and that it is this falling of the viscera which causes the strain on the points along the course of the drainage canal at which the lines of stress and strain have crystallized into definite bands. In the prone position, as on the operating table, this ptosis is temporarily overcome, of course, and no kink is visible upon superficial examination, no matter how definite it may be when the individual is in the upright position. By lifting up the bowel the kink comes into view. This is just the reason why the radiologist should study his subjects in both positions, and at the operating table.

It is important, as Lane and Jordan have so often repeated, that the alimentary tract be regarded as a whole, that its diseases should not be regarded as "isolated phenomena," but that local manifestations along its course and in accessory organs be regarded as expressions of a general disorder. As we all know, Lane maintains that many diseases, such as gastric ulcer, cancer, gall-stones, rheumatoid arthritis, and others, are the remote results of chronic intestinal stasis. This theory forms an important part of the "obsession" which the great pioneer is supposed by some to harbor. It is not the purpose of this communication to attempt to prove or disprove this theory. There seems, however, to be much food for thought just here, as some of the cases

which I shall presently show, will demonstrate. According to Jordan, "the general disease at the bottom of the case can always be revealed by a complete radiological investigation of the alimentary system," and it is just this contention which, it seems to me, should stimulate radiologists to make careful and painstaking investigations along the lines laid down by Lane and Jordan.

In this connection I wish to emphasize the importance of the fluoroscopic examination in all cases. "X-ray diagnosis after a bismuth meal," according to Jordan, "depends entirely upon observations with the fluorescent screen. It is all-important to watch the movements accompanying respiration, the peristaltic activities of the different parts, and to ascertain the presence of fixed parts (e. g., in the terminal ileum), and of thickened parts (terminal ileum, appendix, iliac colon, etc.) by direct manipulation under the fluorescent screen. The patient must, therefore, be as accessible to the observer as he would be to the surgeon about to operate upon him. In commencing the investigation," he continues, "we gain an important clue at the first examination when we observe the duodenum. This is without doubt, the most sensitive part of the alimentary tract; even the early stages of intestinal stasis produce their inevitable effect upon the duodenum which becomes distended from obstruction (by kinking) at the commencement of the jejunum. The difficulty this kink causes the duodenum is obvious when the duodenum is observed (by the fluorescent screen) full of bismuth emulsion. In the first place the duodenum is obviously enlarged; its vertical portion measures 4 to 5 inches instead of $2\frac{3}{4}$ to $3\frac{1}{4}$ inches as in normal cases. The width of the duodenum is often double that of the normal, the first part of the duodenum being especially dilated. More remarkable by far than the increased size is the altered behavior of the 'static' duodenum. It is exceedingly active, strong waves following one another along the four parts of the duodenum, and thrusting the contents be-

fore them. The strong waves are not effective, however; the contents get no farther than the third or fourth part of the duodenum; and as the wave passes off the whole of the contents flow back rapidly to the second (vertical) part. This event is often seen to recur over and over again, and for ten minutes or more no bismuth will enter the jejunum; then perhaps a peristaltic wave will come more powerful than any, and a full measure of bismuth fluid will enter the jejunum, the kink having been overcome for the moment. So powerful are the efforts of the 'static' duodenum that the entire organ gets distorted into various forms, giving the appearance of 'writhing.'" Thus, Jordan says, "The radiologist can demonstrate not only the end result (such as a gastric or duodenal ulcer), but also the various manifestations due to stasis itself. They should make any surgeon think twice before he decides to be content with the old order of things."

I have quoted these statements from Jordan, who has had a wider experience, having worked with Lane for so long, than perhaps any other radiologist has had in the study of the particular conditions under discussion, because I wish, in so far as I am able, to encourage this kind of work. I have frequently noted the tendency of the X-ray worker to become discouraged after a few fruitless attempts at diagnosing conditions involving the alimentary tract. The wonderful success which Jordan and those who have persisted have attained should encourage others to renewed determination.

In this connection I wish to express my sincere appreciation of the careful and painstaking work which Dr. Quimby, Dr. Cole, and others, have been doing in this direction. I have purposely selected for presentation on this occasion cases in each of which Dr. Quimby has made the fluoroscopic and radiographic examinations. He has presented the radiographic phase of these cases, showing the findings before operation, as revealed by fluoroscopic and X-ray examinations. By reference to his find-

ings the operative findings may be tallied with them. This is another manner of presenting the checking-up method and is adopted largely for the purpose of stimulating interest in this comparative plan of study.

I may explain, in passing, how the drawings from which my lantern slides are prepared are made. In the first place, I try to have a stenographer present in the operating room, to whom are dictated the findings. The medical illustrator makes a rough sketch of the conditions found, just as they appear to him or her at the operation. It requires only a few minutes for the surgeon to demonstrate these to the artist, who is skilled in this kind of work. The findings are then checked up by the assistants, and sometimes by visiting surgeons. From this operating-room sketch the artist builds up the drawings, with the assistance of the stenographer's notes, the checkings of the assistants, and the findings of the surgeon. Each picture is, therefore, an accurate interpretation of conditions as actually found upon the operating table.

It is obviously difficult, however, to put into each picture every phase of the pathological condition. Therefore, for purposes of clarity, without the sacrifice of accuracy,

each picture emphasizes some special point or points.

What has been said with reference to the difficulty of portraying in a single picture every phase of the pathological condition found in a given case, applies equally to the X-ray plates. Many plates would be required for such a complete demonstration.

For the above reasons all the findings shown in the drawings may not be represented in the X-ray plate or plates of the same patient, yet the features in which the operative findings shown corroborate the radiographic findings are quite sufficient to establish the importance of the X-ray as an aid to diagnosis in cases of presumptive chronic intestinal stasis.

In the following cases I have purposely omitted the general history, the treatment, the immediate and remote results, our only concern here being a comparison of the radiographic and fluoroscopic with the operative findings.

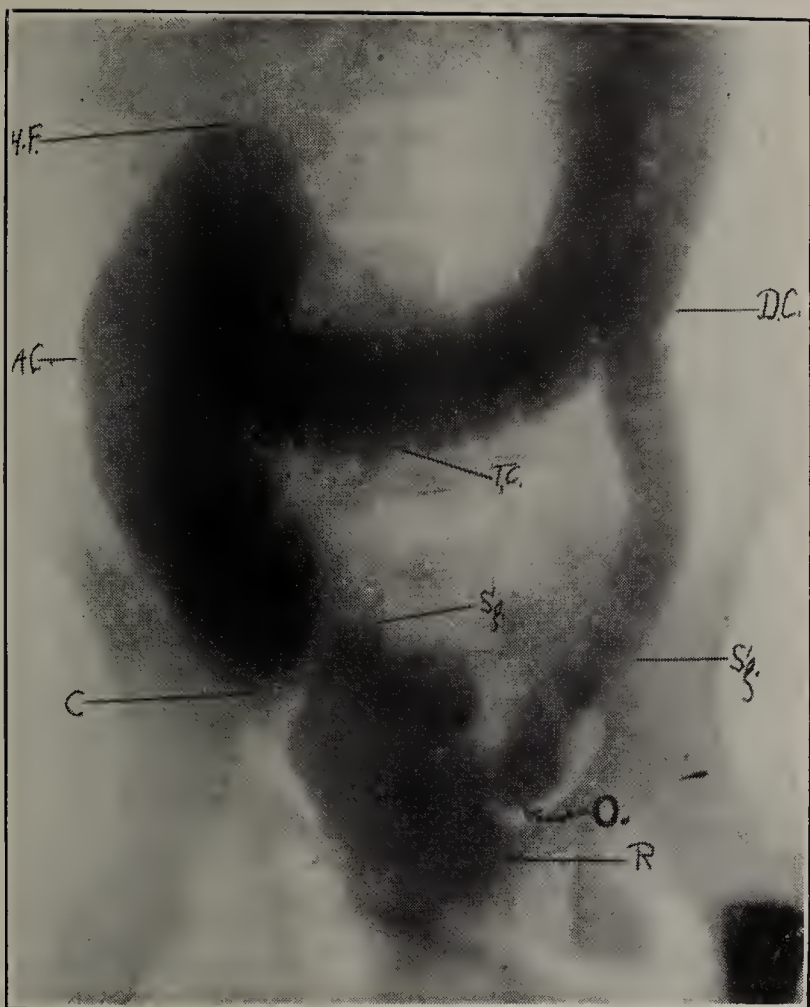
An inspection of both the operative findings and artist's sketches should be made to obtain a proper conception of conditions found within the abdomen at operation, and these should be compared with the Roentgenographic findings to get full confirmation of the value of the X-rays when preoperative determinations are made.

QUIMBY AND BAINBRIDGE

Case No. I

	Radiographic Findings (Before Operation)	Operative Findings
No. I. Male, 41. Referred by Dr. J. Douglas Nisbet, New York City. Operation, N. Y. Polyclinic Hosp., April 24, 1914.	Gastric delay of mild degree, due to interference in duodenum, pronounced only when patient was in erect position. Pyloric ulcer. Evidence of small mucous ulcer in first portion of duodenum. Chronic appendicitis; appendix kinked near its tip. Patulous ileocecal valve. Angulation in right transverse colon, due to a loosely formed membrane binding the hepatic angle. Acute angulation of splenic flexure. Evidence of a membrane binding pelvic sigmoid. General appearance of structures occupying lower right abdomen indicates probability of "Jackson's membrane" incompletely formed and interfering with various structures.	Stomach prolapsed and enlarged, but no evidence of ulcer on either stomach or duodenum, as determined by palpation and inspection.* Appendix angulated, congested and bound tightly to pelvis; filled with fecal matter. Patulous ileocecal valve. Cecum and part of ascending colon attached by band to iliac fossa on lateral wall. Terminal ileum and head of colon bound tightly to brim of pelvis. Accentuated last kink of sigmoid, with angulating band of adhesions. Colon dilated above and colon and rectum below.

*A mucous ulcer may be present and not seen by the operator unless stomach or intestine be opened.



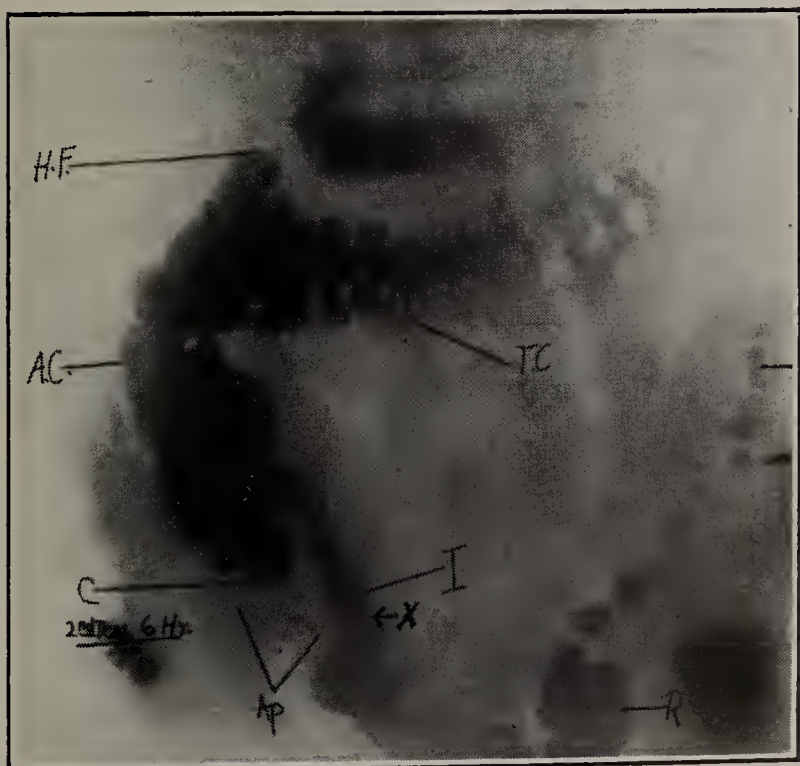
Case I, FIG. 1.

- C. Cecum.
- T. C. Transverse Colon.
- Sg. Sigmoid.
- O. Kink of Sigmoid, "Last Kink."
- R. Rectum.



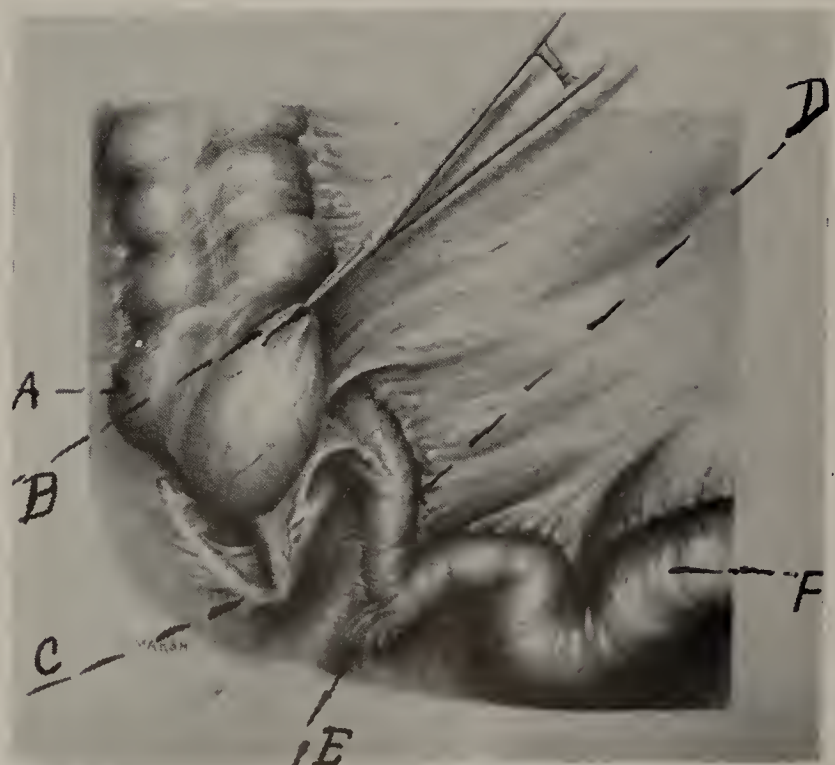
Case I, FIG. 1-a.

- A. Descending colon.
- B. Band causing accentuation of "last kink."
- C. "Last kink," greatly accentuated.
- D. Rectum.



Case I, FIG. 2.

- C. Cecum.
 - A. C. Ascending Colon.
 - I. Terminal Ileum.
 - Ap. Appendix.
- The kink in the Appendix is seen in that portion lying close to the Ileum.
The ileal kink is a fixed point in the Ileum, marked X.



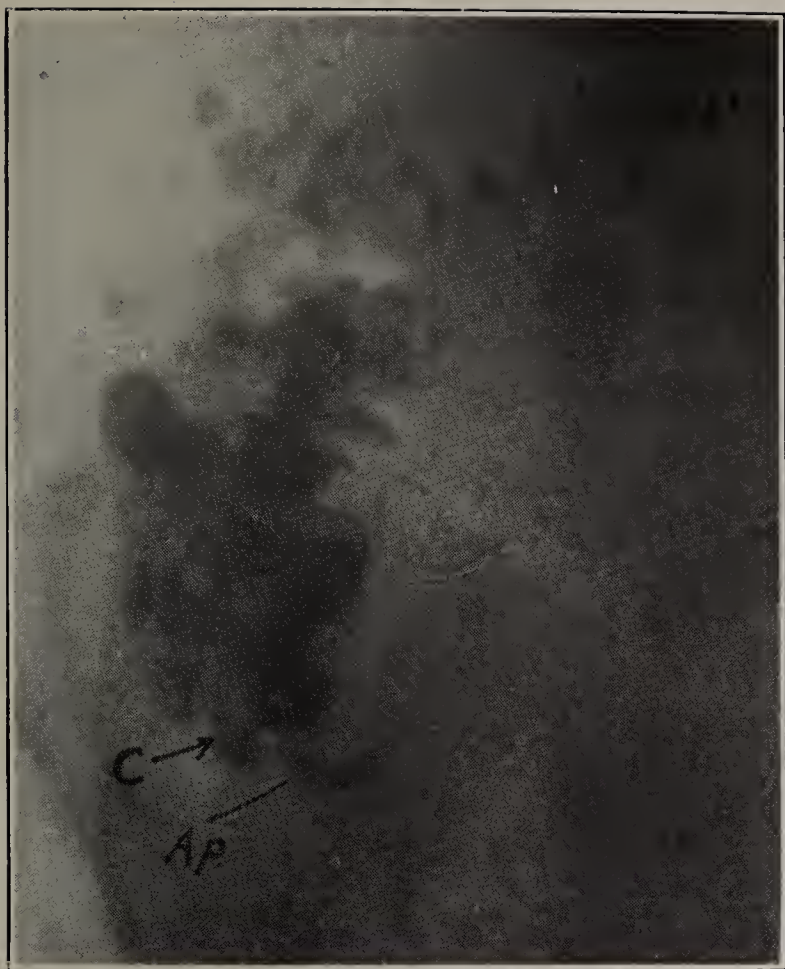
Case I, FIG. 2-a. (At a higher level.)

- A. Cecum.
- B. Forceps holding up caput coli, which had become dilated, forming a large flabby pouch.
- C. Angulated appendix, with bands.
- D. Constricted portion of terminal ileum, with tight attachment to pelvic wall.
- E. Lane's band (Ileopelvic band).
- F. Dilated ileum.

Case No. II

	Radiographic Findings (Before Operation)	Operative Findings
No. II. P. Male, 38. Referred by Dr. William Van Valzah Hayes, New York City.* Operation, N. Y. Poly- clinic Hospital, April 24, 1914.	Examination, July, 1913. Gastric ulcer on the lesser curvature near the pylorus. Gastric delay which may be due to angulation of the duo- denum at the juncture of the first and second portion. A Lane kink which is only opera- tive in the erect position, there being no organic change or kink producing obstruction when the patient is horizontal. There is some regurgitation of the enema into the ileum. A chronic type of appendix, which may be adherent to the iliac mesentery. A loop in the descending colon, probably due to a mesenteric band. Re- dundant sigmoid. Partial examination. April, 1914, only of stomach and duo- denum. Gastric ulcer, on lesser cur- vature, near pylorus. Angulation of duodenum.	Pylorus somewhat constrict- ed, with slight induration on upper and posterior aspect, toward gastric side. Duodenum distended. Gastro-hepatic omentum con- siderably thickened at its free edge, over the foramen of Winslow; it was also shortened. Opposite this point on greater curvature was a thickened por- tion of great omentum which formed a band extending down to the cavum Retzii and to right iliac fossa, below appendix. Typical ileopelvic (Lane's band), very strong. Terminal ileum, caput coli, and angulated appendix tightly bound down by strong bands of adhesion.

*NOTE: This patient was examined by Dr. Alfred C. Jordan, in London, last year. On April 21, 1914, he saw the patient again, this time in my office, in consultation with me. At this time he examined the radio-graphic plates made by Dr. Quimby. Dr. Jordan said: "There is well marked distension of the duo-
denum, with tenderness to pressure. The terminal coil of the ileum is hypertrophied and feels like a
cord. There is tenderness over this coil."



Case II, FIG. 3.

C. Cecum.

Ap. Appendix.

The portion of the appendix exhibited is the first half; the remainder curves backward.

The bismuth in the cecum demonstrates the presence of cecal stasis.



Case II, FIG. 3-a.

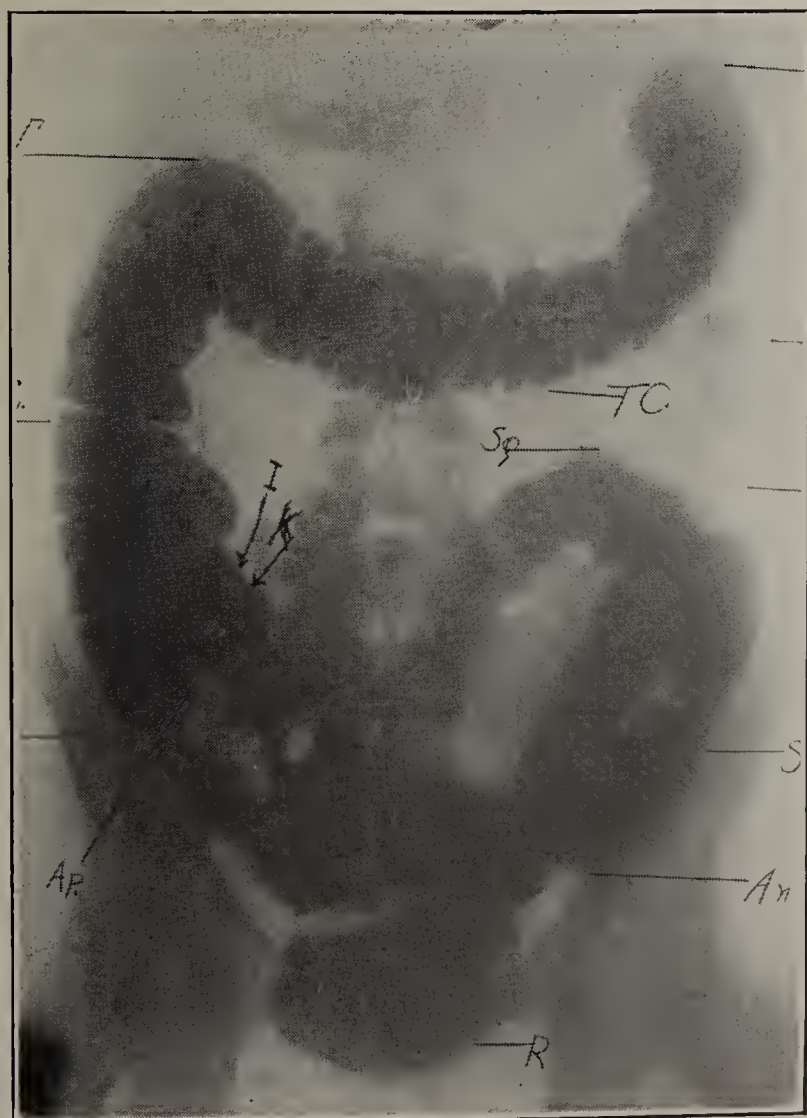
A. Gall-bladder.

B. Dilated duodenum.

C. Stomach.

D. Great omentum, attached to upper and anterior surfaces of bladder, and to right iliac fossa.

E. Bands about appendix and head of colon. (See Fig. 4-a for enlargement.)



Case II, FIG. 4.

This plate was taken immediately after the bismuth enema, and six hours after a bismuth meal. The fixed point in the terminal ileum is marked K.



Case II, FIG. 4-a.

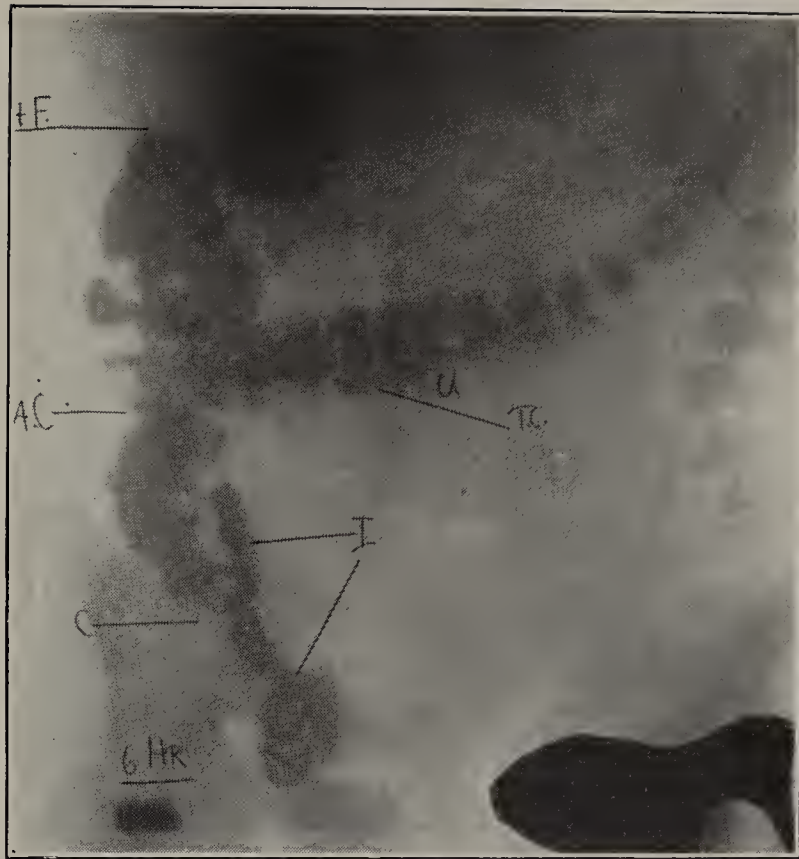
A. Ileopelvic (Lane's) band.

B. Angulated appendix.

Case No. III

	Radiographic Findings (Before Operation)	Operative Findings
No. III. F. Male, 40. Referred by Dr. William Van Valzah Hayes, New York City. Operation, Alston's Pri- vate Hospital, June 18, 1914.	Kinking of duodenum at junc- ture of first and second portions. Evidence of ulcer at this place. Moderate dilatation of duo- denum.* Band constricting terminal ileum. Evidence of a loosely formed adhesion or band in right trans- verse colon; this does not seem to offer material obstruction. Kinking of sigmoid at junc- ture of iliac and pelvic portions.	No duodenal constriction. Ileum pulled down alongside of cecum, and adherent to pelvic floor. Cecum dilated, rotated and firmly adherent to lateral wall of pelvis. Sigmoid colon very redundant and angulated by adventitious kinking band.

*It is to be noted that a horizontal position often corrects a simple kink.

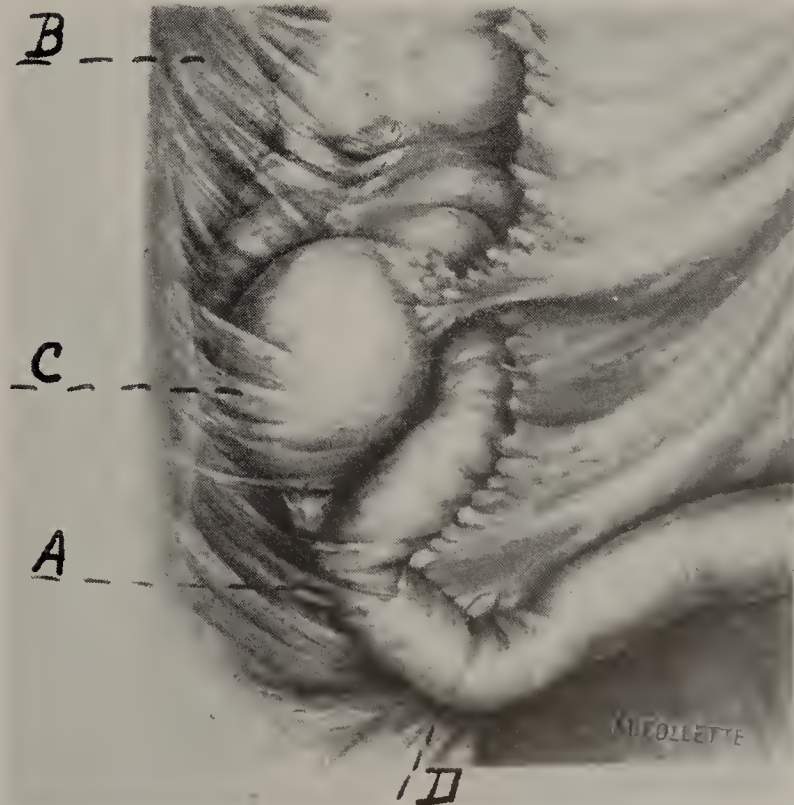


Case III, FIG. 5.

- C. Cecum.
- A. C. Ascending Colon.
- I. Ileum.

The terminal ileum and cecum cannot be separated, and except that the terminal portion is almost straight in the Roentgenogram the fixed relationship between the terminal ileum and cecum is as manifest as in the accompanying sketch.

The thinned-out portion of the ascending colon above the cecum corresponds to the segments of the attached membrane.

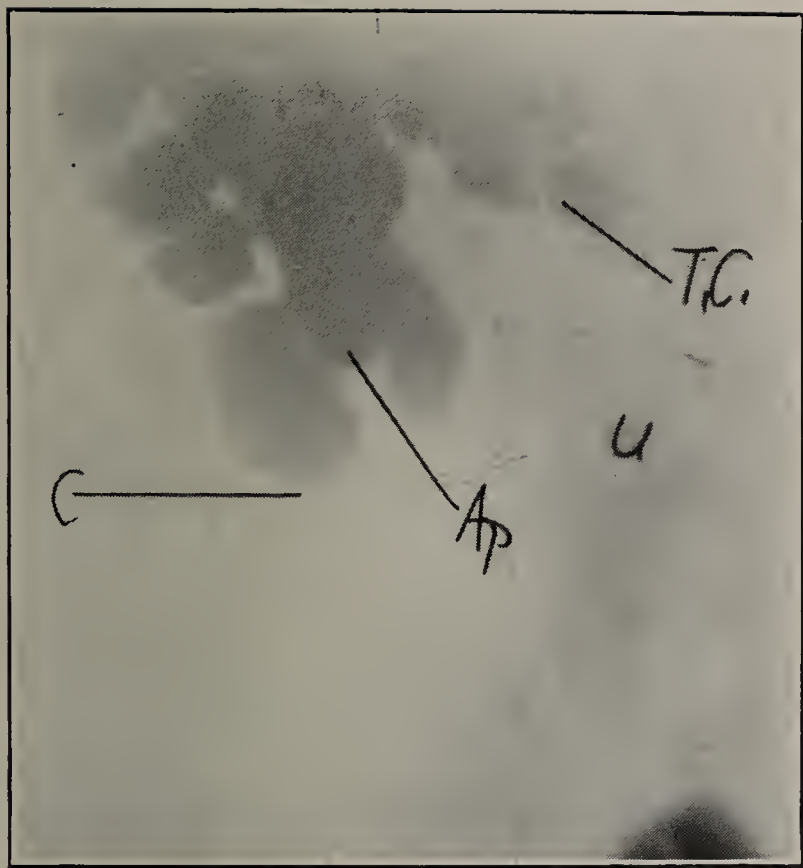


Case III, FIG. 5-a.

- A. Bands of adhesion attaching terminal ileum to posterior wall of right iliac fossa.
- B. "Jackson's membrane."
- C. Twisted caput coli attached to pelvic wall.
- D. Ileopelvic band. (When terminal ileum is allowed to drop into pelvis, as in upright posture, there is marked kinking at this point.)

Case No. IV

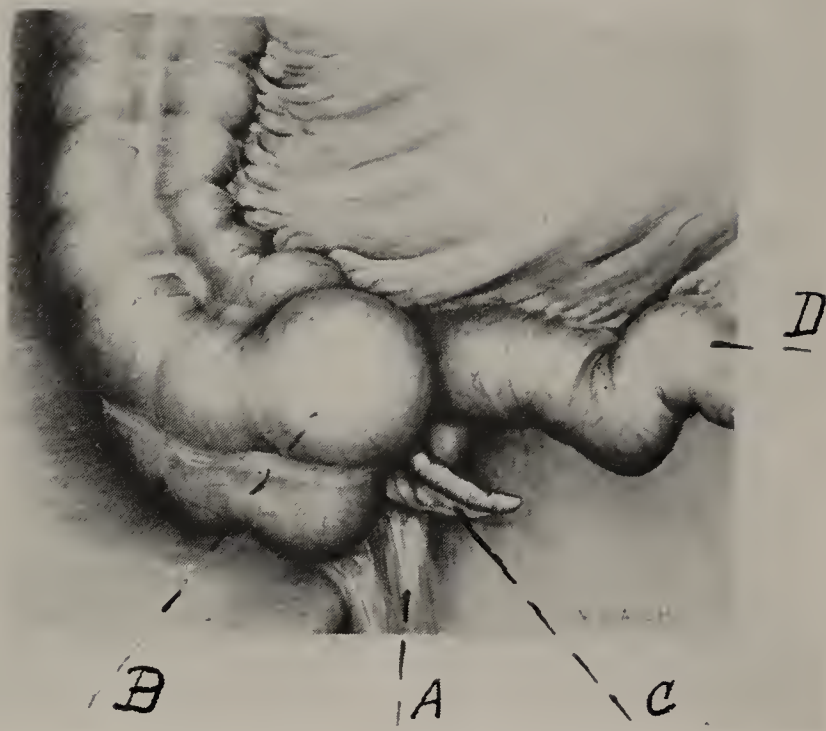
	Radiographic Findings (Before Operation)	Operative Findings
No. IV. E. Male, 38. Operation, N. Y. Polyclinic Hospital, March 24, 1914.	Evidence of adhesions of first portion of duodenum. Chronic appendicitis. While appendix readily drains, it is placed in an unfavorable position, especially when patient is erect. There is evidence that it is kinked. Loosely formed adhesions between ascending and transverse colon, producing an acute angulation in the latter portion of colon. A mesenteric band or a contracted mesentery just above iliac crest on ascending colon. Patulous ileocecal valve. There may be a band just above cecum.	Healed ulcer of duodenum $\frac{3}{4}$ in. beyond pyloric orifice. Below site of ulcer a number of bands extended from behind across duodenum, indenting it toward transverse colon and greater curvature of stomach. Transverse colon much collapsed. Hepatic flexure hung downward almost to umbilicus. Splenic flexure well supported. Mobile cecum; posterior band was anterior and below, forming an angle, around a fixed point at the base of the appendix. The mid-point of the appendix, which was five inches long, represented a band extending into pelvis, around which mobile cecum rotated. Patulous ileocecal valve. Dilated terminal ileum. Several adventitious bands about sigmoid. Ileopelvic (Lane's band) with meso-appendix attached to it.



Case IV, FIG. 6.

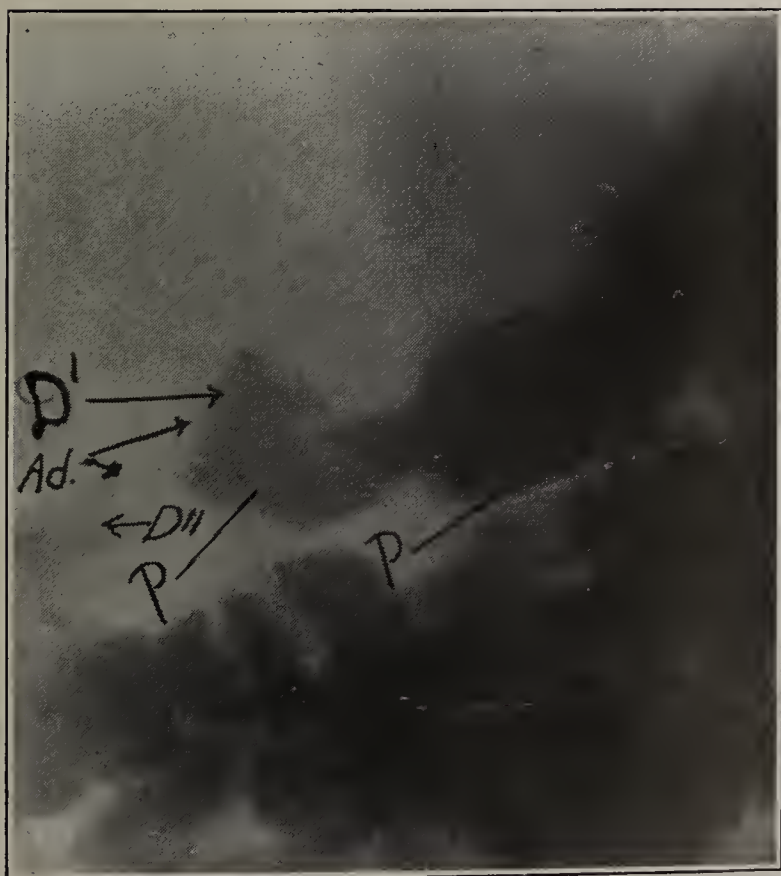
C. Cecum.
Ap. Appendix.

By forcible retraction upward a small portion of the appendix could be seen, and its relative position determined.



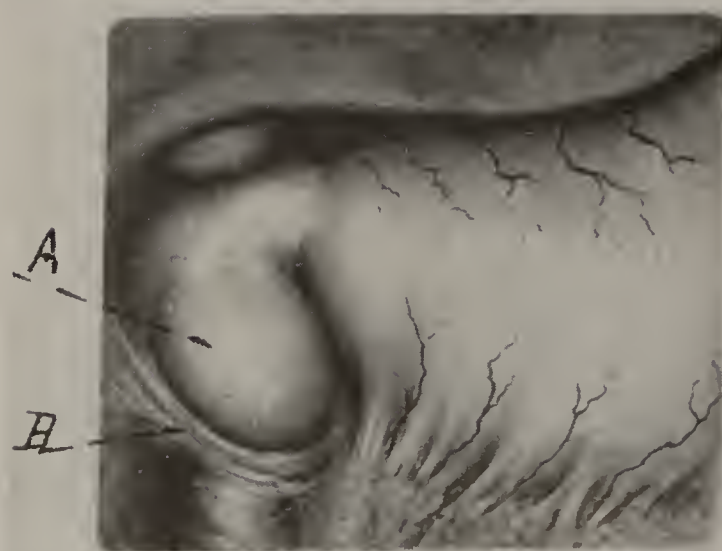
Case IV, FIG. 6-a.

A. Very strong ileopelvic (Lane's) band.
B. Mobile cecum.
C. Meso-appendix attached to Lane's band.
D. Dilated terminal ileum, with patulous ileocecal valve.



Case IV, FIG. 7.

D'. First portion of Duodenum.
D''. Second portion of Duodenum.
Ad. Location of Adhesions of the Duodenum.

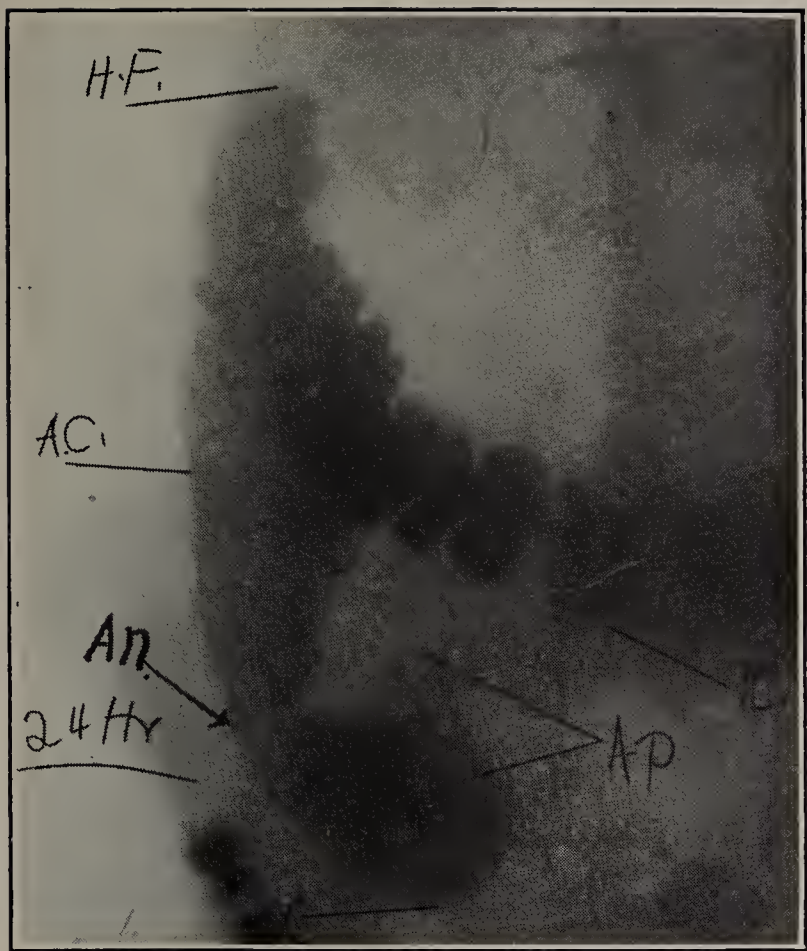


Case IV, FIG. 7-a.

A. Dilated duodenum.
B. Band of constriction across duodenum.

Case No. V

	Radiographic Findings (Before Operation)	Operative Findings
No. V. X. Female, 45. Operation, St. Elizabeth's Hospital.	Ulcer near pylorus. Evidence of small diverticulum above lesser curvature; this did not remain constantly filled. Evidence of adhesions near apex of conus duodenalis. Ptoxis of cecum. Appendix adherent and kinked near its middle; its position suggested that it was probably attached to ileum or its mesentery; it is of chronic or non-functioning type. Probably two mesenteric bands on ascending colon, one just above cecum, the other just below hepatic flexure. Probably loosely formed adhesion to left transverse colon. Pelvic sigmoid redundant and dilated. Rectum dilated.	Transverse and ascending colon adherent to anterior abdominal wall and to falciform ligament of liver. Ascending colon adherent to transverse colon by strong bands; ascending colon angulated on itself, and held tightly to the lateral wall, deep down in the abdomen, the angulation almost obstructing its lumen, about midway between hepatic flexure and ileocecal valve. Chronic appendicitis. Appendix free. On under surface of mesentery of ileum beginning ileopelvic band. Practically no hepatic flexure; transverse colon held up only by bands to anterior abdominal wall and by "Jackson's membrane." Duodenum greatly dilated, duodeno-jejunal kink below. Scar of old ulcer constricting pylorus with adhesions below, catching hold of great omentum and dragging it upwards. Ulcer scar on lesser curvature. Beginning evolutionary bands on under surface of mesentery of ileum.

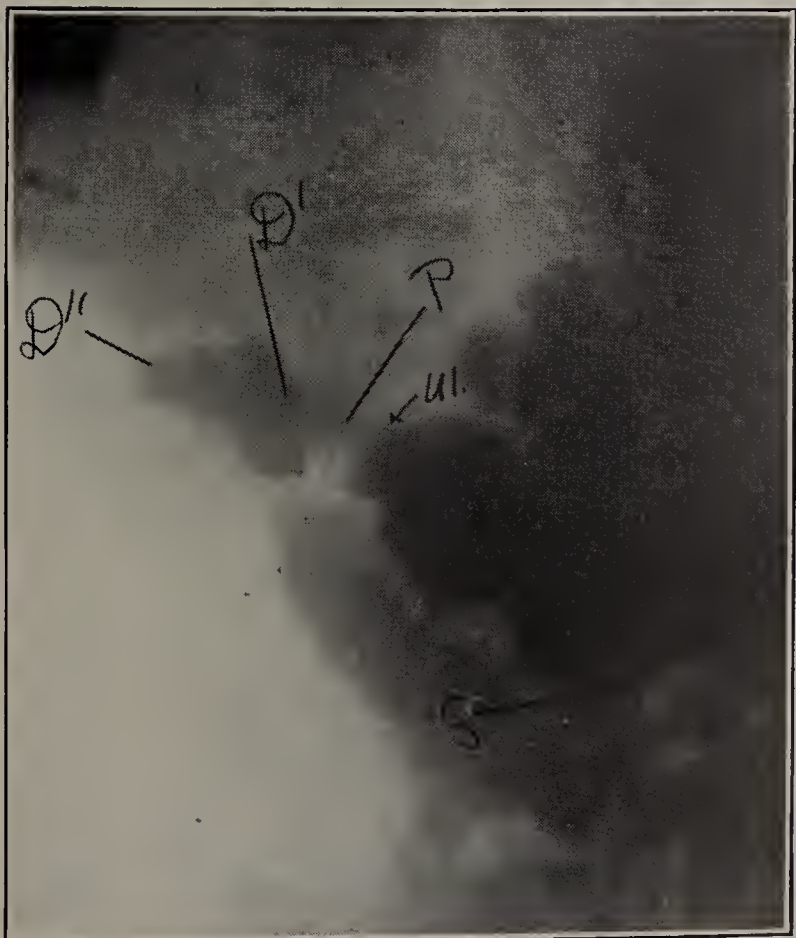


Case V, FIG. 8.

C. Cecum.

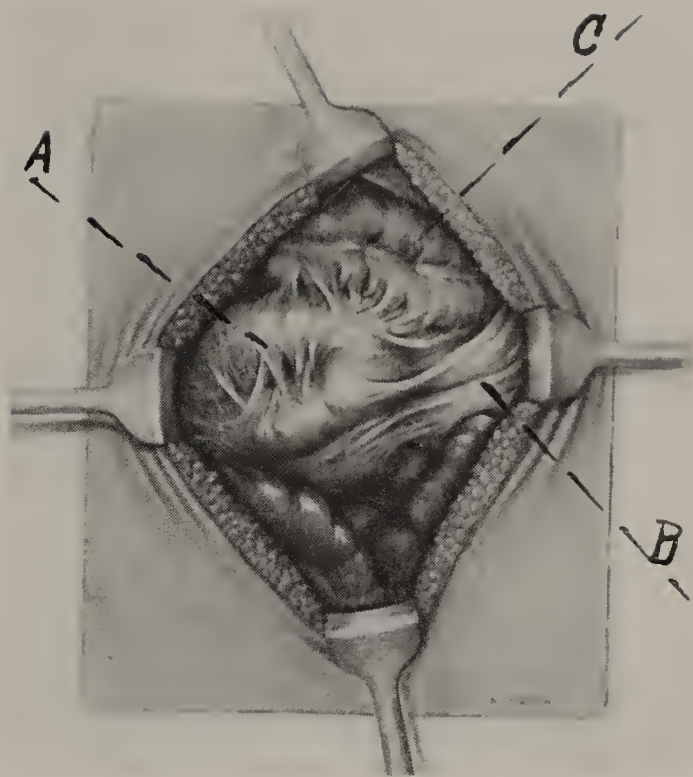
Ap. Appendix.

An. Angulation of Ascending Colon; this corresponds to the location of the adhesions of the ascending colon, which produced the most marked deformity.



Case V, FIG. 9.

There is deformity on the gastric side of the pylorus, which was constant throughout the series of stomach plates. There was constant defect in the duodenum near the apex of the conus-duodenalis.

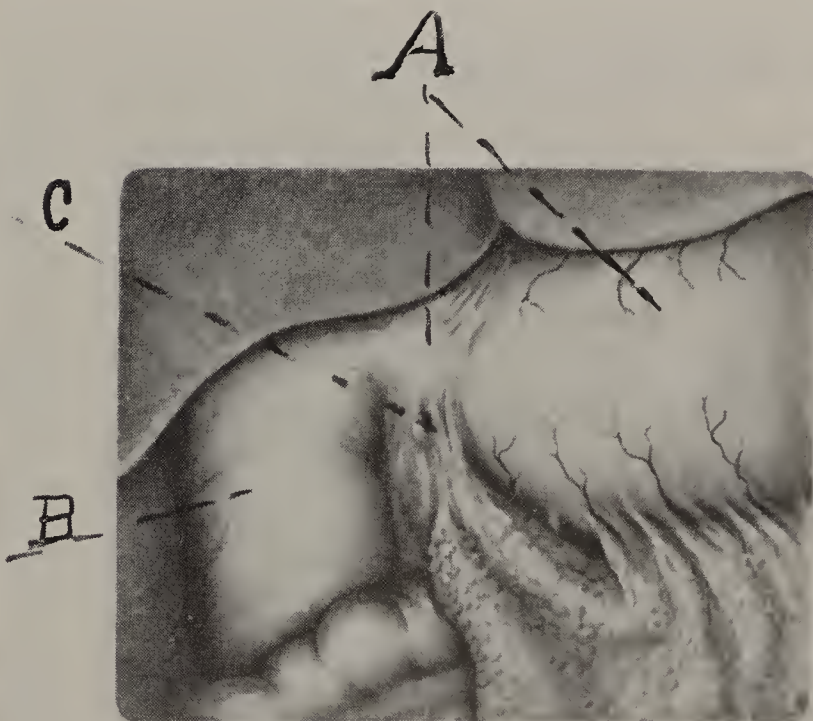


Case V, FIG. 8-a.

A. Ascending colon, angulated, with many adhesions.

B. Adhesions from anterior abdominal wall to ascending colon.

C. Transverse colon fastened by adhesions to kinked portion of ascending colon, near hepatic flexure.



Case V, FIG. 9-a.

After separating adhesions shown in Fig. 8-a, the following conditions were found in right upper quadrant:

A. Sites of old ulcers.

B. Dilated duodenum.

C. Edge of great omentum attached to pyloric scar.



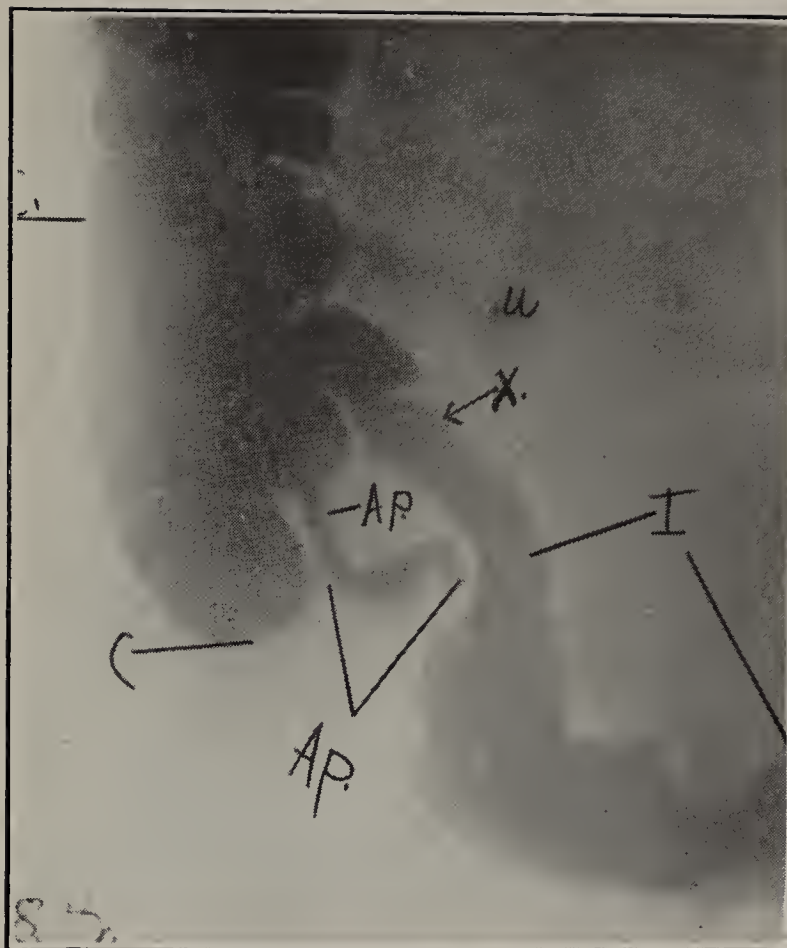
Case V, FIG. 9-b.

A. "Jackson's membrane."

B. White lines showing beginning lines of stress to form ileopelvic bands.

Case No. VI

	Radiographic Findings (Before Operation)	Operative Findings
No. VI. M. Male. Referred by Dr. H. M. Fleck, Bridgeport, Conn. Operation, N. Y. Polyclinic Hospital, Jan. 31, 1914.	Adhesions of pyloric end of stomach; these may involve first portion of duodenum. Ileal kink. Kinked appendix, presenting evidence of being adherent at tip; the kink is evidently due to a band or contracted portion of meso-appendix. Evidence of a few adhesions involving transverse colon.	Appendix, extending to left, large, distended with fecal matter, adherent at about its middle, where it was twisted, but not to the point of obstruction. Adhesions below ileum. Ileopelvic band. Omentum extensively adherent to under surface of liver and pyloric region. Mobile cecum.

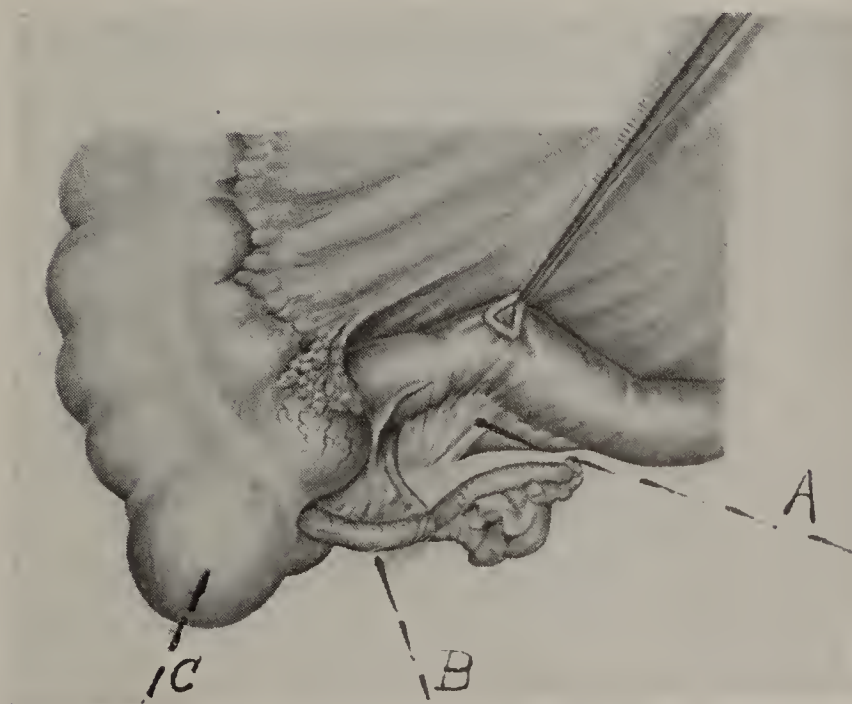


Case VI, FIG. 10.

- I. Ileum.
- Ap. Appendix.
- C. Cecum.

The kink of the appendix can be seen near the end of the filled portion.

The fixation point in the terminal ileum is marked X, and corresponds to the position of the ileal kink.



Case VI, FIG. 10-a.

- A. Ileopelvic band.
- B. Torsion of appendix, distended with fecal matter.
- C. Mobile cecum.

Case No. VII

	Radiographic Findings (Before Operation)	Operative Findings
No. VII. M. Female, 27. Referred by Dr. L. C. Menger, Brooklyn, N. Y. Operation, Alston's Private Hospital, May 30, 1914.	Gastric delay due to kinking of duodenum. Ileal kink; this does not present all the characteristics of a simple Lane's kink. Appendix probably adherent at its tip, but a contracted meso-appendix may account for its fixation. No interference with drainage of appendix. Doubtless subject to traction when patient is erect. Some evidence of fixation of middle of transverse colon.	Narrow band running from transverse meso-colon to pylorus, causing marked constriction of pyloric orifice. Evidence of old ulcer on extreme upper point of first portion of duodenum and approaching pylorus. Greatly distended duodenum. Transverse colon prolapsed into pelvis. Appendix long, curved toward iliac crest; its tip firmly adherent by fibrous bands to transverse meso-colon, forming complete half circle. Cecum long and mobile. Ileum, at point four inches from ileocecal valve, firmly adherent to pelvic floor by fibrous band three inches wide. Pelvic colon firmly anchored above brim of pelvis by three bands.

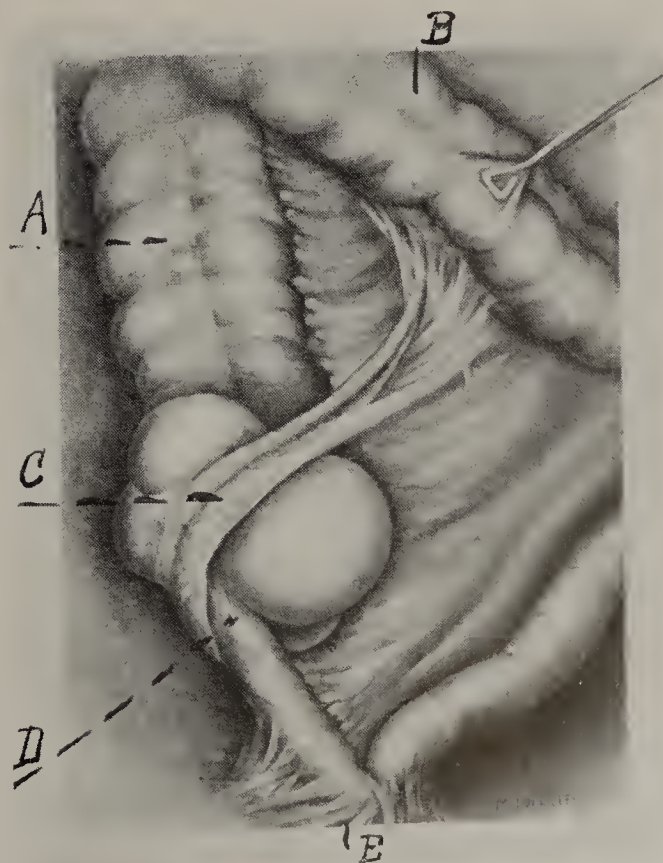


Case VII, FIG. 11.

Ap. Appendix.

C. Cecum.

There is a constriction just above the cecum, and the appendix passes up over the cecum in somewhat the same manner as exhibited in the accompanying tracing, except that in the latter the cecum has been carried up to expose the ileum. The twist of the cecum accounts for the decrease in caliber at the beginning of the ascending colon.



Case VII, FIG. 11-a.

A. Ascending colon.

B. Enteroptotic transverse colon.

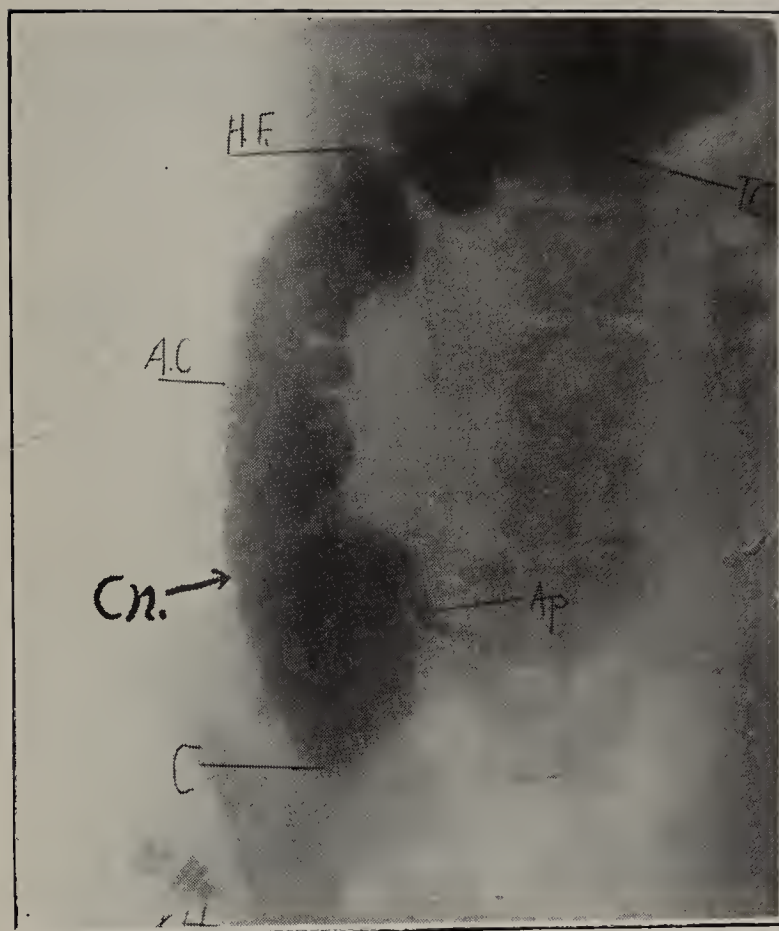
C. Appendix adherent close to transverse mesocolon, with volvulus cecum.

D. Terminal ileum.

E. Broad ileopelvic band.

Case No. VIII

	Radiographic Findings (Before Operation)	Operative Findings
No. VIII. B. Female, 37. Operation, Alston's Private Hospital, March 18, 1914.	Gastric ulcer. Chronic appendicitis. Appendix lying transversely, tip apparently adherent beneath ileal mesentery. Constriction or kink near tip. Band or membrane just above cecum. Probably a small mesenteric band on descending colon. Evidences of adhesions binding iliac sigmoid in iliac fossa.	Ulcer on middle of lesser curvature of stomach. Broad band of old adhesions from inner half of appendix to pelvis. Distal half of appendix free. Adhesions between ascending colon and right parietal peritoneum. Left ovary buried in mass of adhesions which were attached to sigmoid colon, giving it an excessive angle. A light band of adhesion at duodeno-jejunal angle.



Case VIII, FIG. 12.

Ap. Appendix.

C. Cecum.

A. C. Ascending Colon.

Cn. Constriction in the ascending colon corresponding to the band illustrated on the accompanying cut.

The proximal portion of the appendix is filled with bismuth.



Case VIII, FIG. 12-a.

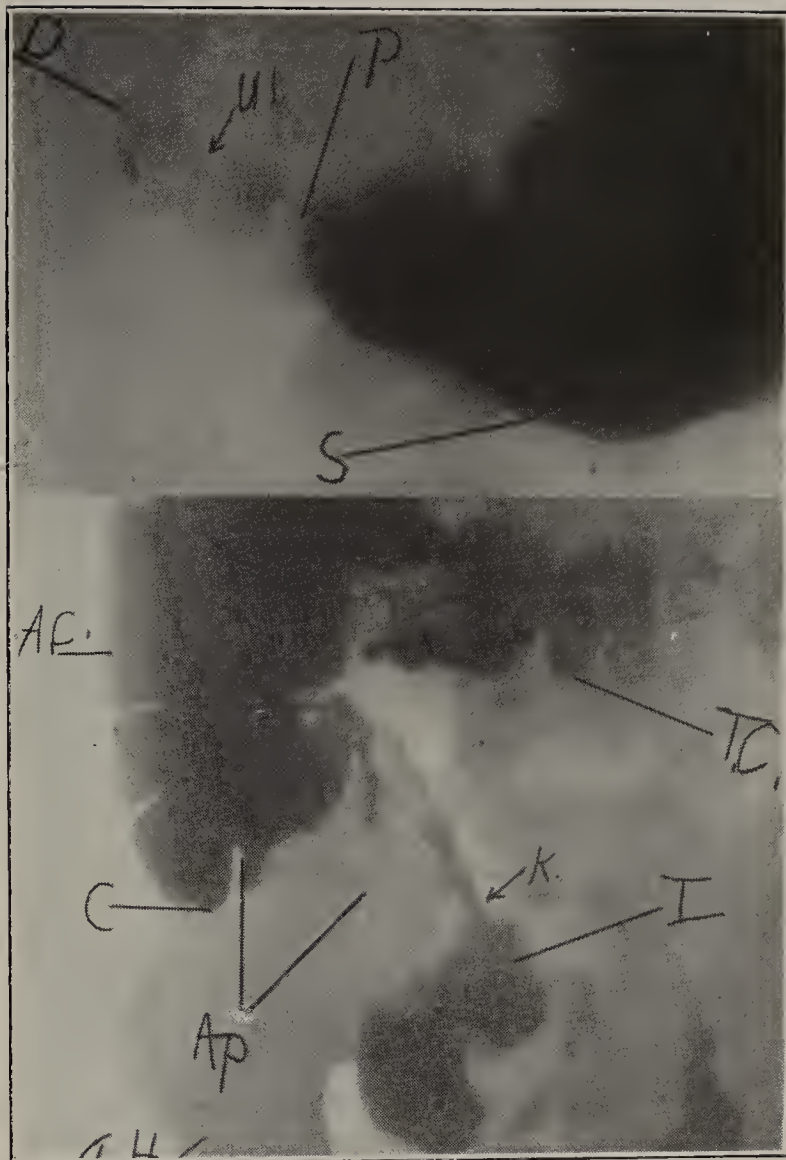
A. Twisted appendix.

B. Very strong band across ascending colon, causing considerable obstruction.

C. Strong band from appendix to pelvis.

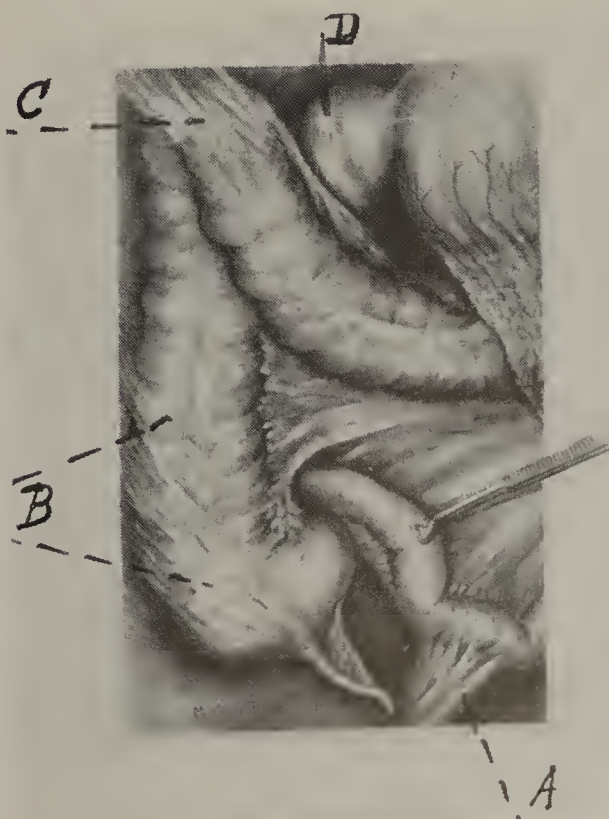
Case No. IX

	Radiographic Findings (Before Operation)	Operative Findings
No. IX. E. Female, 12. Operation, N. Y. Skin and Cancer Hospital, May 25, 1914.	Duodenal ulcer. Many adhesions extending from duodenum to pylorus. Ileal kink, due to adherent appendix. Point of limited mobility of terminal ileum at this place. Patulous ileocecal valve. Appendix evidently kinks when patient is erect, which probably accounts for the poor drainage at tip. Angulation of sigmoid. Some signs of adhesions of sigmoid just above rectum. Moderately redundant sigmoid. Dilated rectum.	Duodenum slightly dilated, showing scar of old ulcer one inch from pylorus. Greater curvature slightly prolapsed. Hepatic flexure of colon drawn up by a band, forming angulation at that point. "Jackson's membrane." Patulous ileocecal valve. Strong band across duodenum just below scar of old ulcer, causing constriction and dilatation. Typical ileo-pelvic band, causing kink. Appendix presented fairly normal appearance on its external surface, but in its interior several small concretions could be palpated.



Case IX, FIG. 13.

- | | |
|---------------|----------------------------|
| S. Stomach. | C. Cecum. |
| P. Pylorus. | A. C. Ascending colon. |
| D. Duodenum. | I. Ileum. |
| Ul. Ulcer. | K. Location of ileal kink. |
| Ap. Appendix. | |



Case IX, FIG. 13-a.

- | |
|---|
| A. Ileopelvic (Lane's) band. |
| B. "Jackson's membrane." |
| C. Strong band, with angulation of hepatic flexure. |
| D. Scar of duodenal ulcer. |

Case No. X

	Radiographic Findings (Before Operation)	Operative Findings
No. X. B. Male, 32. Referred by Dr. Hermann Eichhorn, New York City. Operation, N. Y. Polyclinic Hospital.	Duodenal ulcer, with incomplete obstruction near apex of conus duodenalis. Dilated duodenum. Evidence of adhesions around cecum and appendix. Acute angulation of splenic flexure; there is probably a band binding the pelvic sigmoid.	Stomach prolapsed well down below umbilicus. Hepatic flexure just above umbilicus. Pyloric ulcer scar. Distinct accentuation of last kink, causing fixation of pelvic colon. Transverse colon prolapsed down into true pelvis. Appendix angulated, but formed no part of ileal stasis.* Distinct duodeno-jejunal kink. Duodenum markedly dilated. Constricting band across duodenum extending from under surface of liver.

*Cut 14-a shows bands about cecum and attachment of appendix to the ileopelvic band.



Case X, FIG. 14.

This was taken a few minutes after the enema was administered.

C. Cecum.

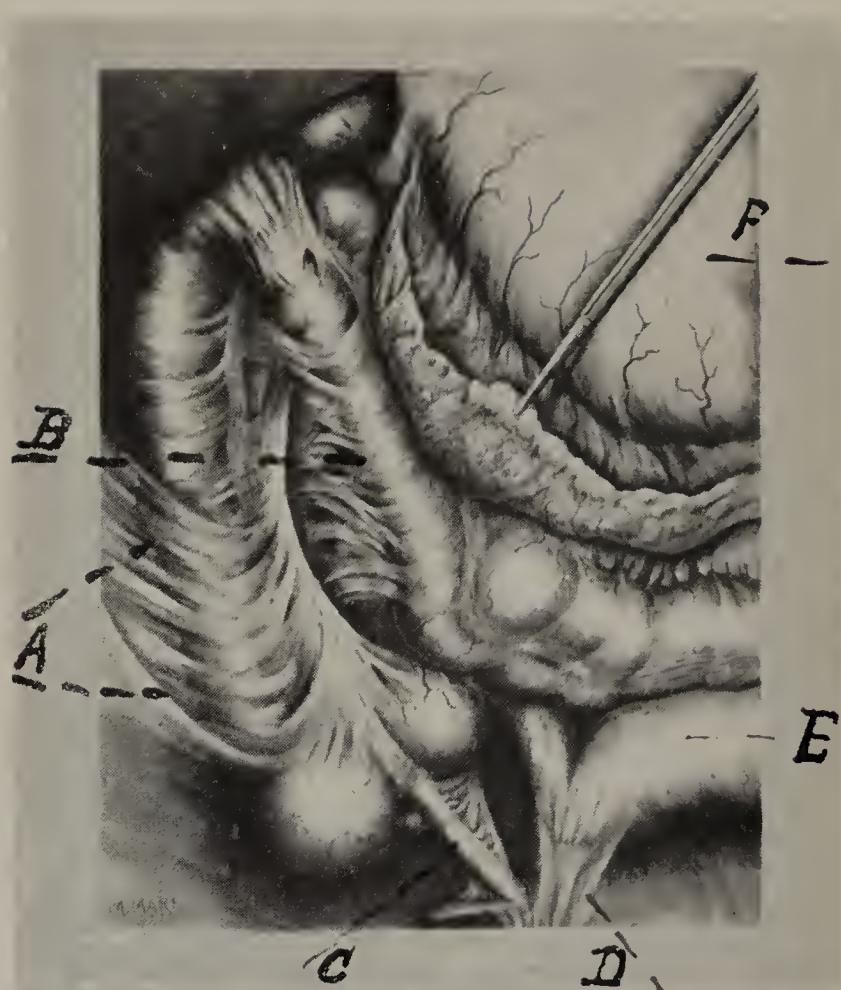
A. C. Ascending Colon.

T. C. Transverse Colon.

Sg. Sigmoid.

K. Sigmoid Kink.

The pronounced interference with the progress of the enema into the ascending colon, especially that portion having the bands, is made manifest by the relatively small quantity in this part, and so the caliber is less than that of the cecum.



Case X, FIG. 14-a.

A. Heavy bands attaching abdominal wall to ascending colon.

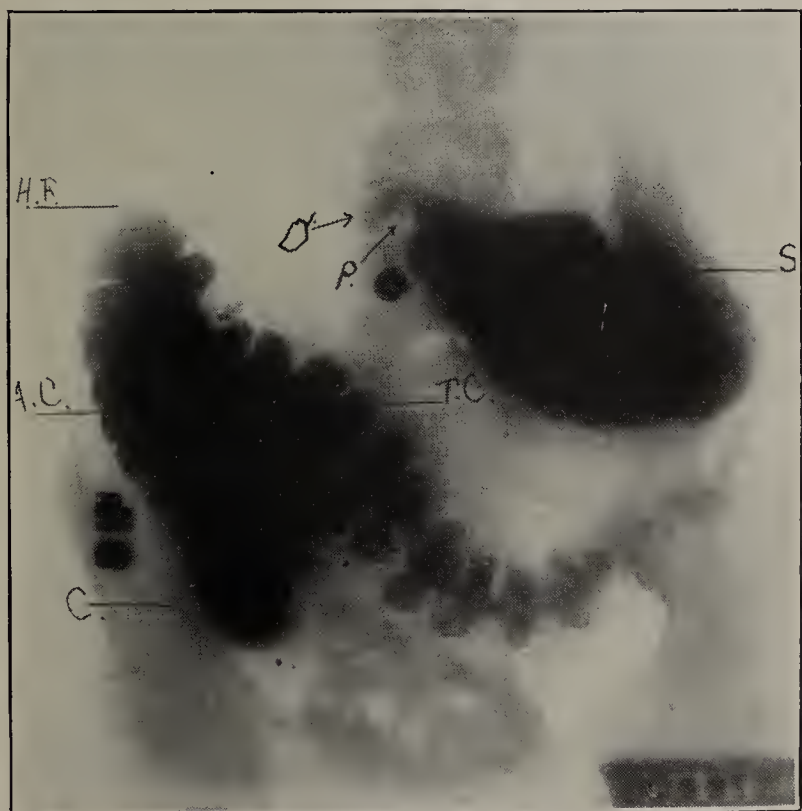
B. Bands attaching transverse colon to ascending colon.

C. Angulated appendix attached to edge of ileopelvic band.

D. Ileopelvic band.

E. Dilated ileum.

F. Dilated stomach.



Case X, FIG. 15.

S. Stomach.

P. Pylorus.

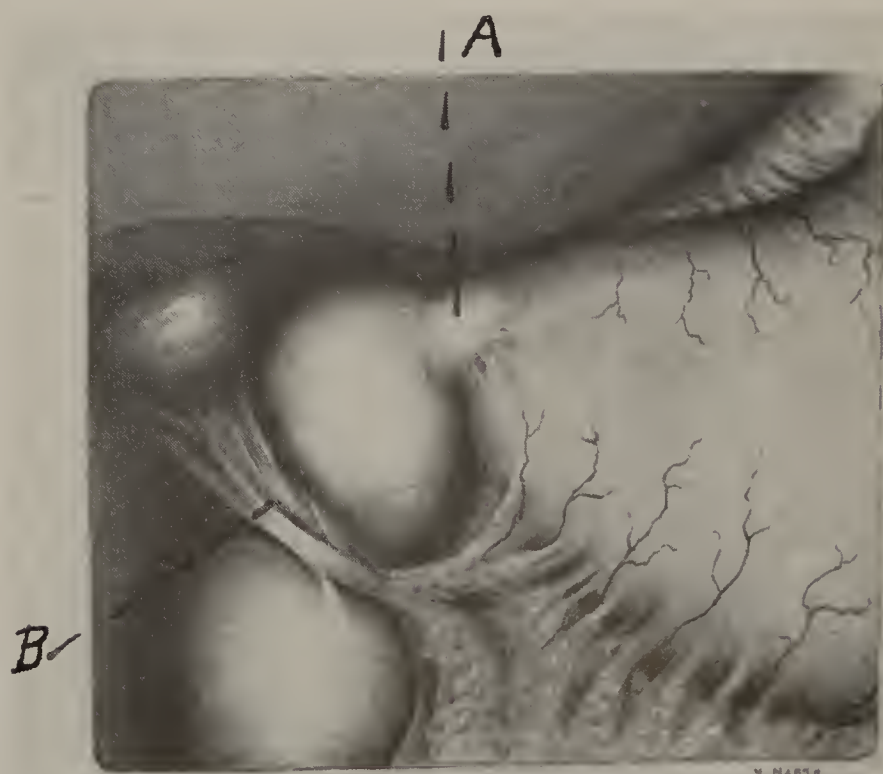
D. First portion of Duodenum, which is incompletely obstructed by a band.

C. Cecum.

A. C. Ascending Colon.

T. C. Transverse Colon.

The bismuth in the colon is that portion which had escaped from the stomach soon after the meal had been administered. A constriction can be seen just above the cecum.



Case X, FIG. 15-a.

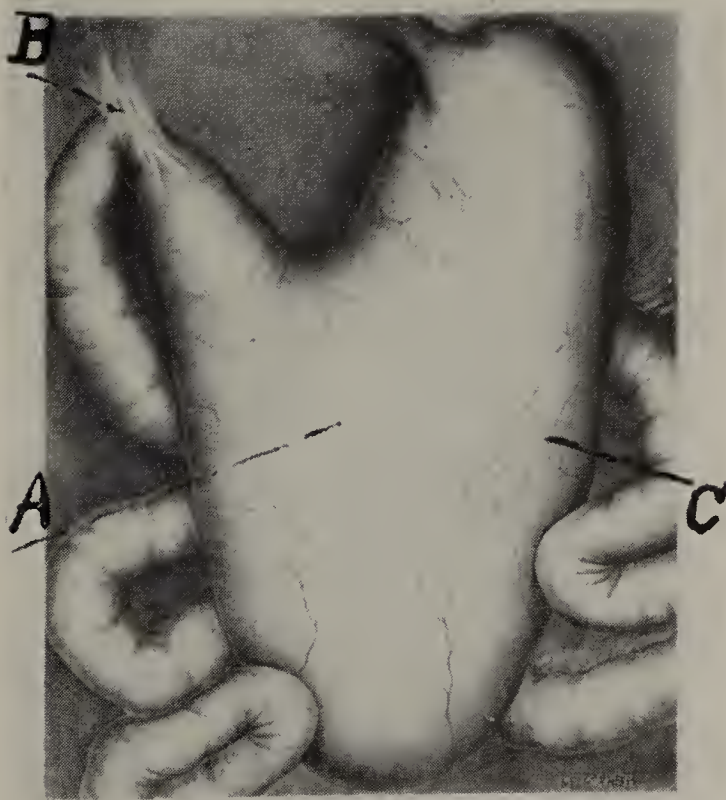
A. Scarred pylorus, contracted.

B. Heavy band across duodenum from under surface of gall-bladder to edge of great omentum, causing hour-glass shape of dilated duodenum.

Case No. XI

	Radiographic Findings (Before Operation)	Operative Findings
No. XI. N. Male, 32. Referred by Dr. William Van Valzah Hayes, New York City. Operation, N. Y. Polyclinic Hospital, Feb. 11, 1914.	Stomach atonic and dilated. Very prolonged gastric retention due to obstruction of duodenum. Deformity about middle of conus duodenalis. Excessive gastric retention prevented further intestinal examination.	Stomach enlarged, extending clear to bladder. Angulation of pylorus.

NOTE:—Subsequent X-ray plates showed reduction in size of stomach about one-half. Anticipating such a reduction, the gastro-enterostomy was made, as indicated in Fig. 16-a, (C), so that, after contraction, it would be at the most dependent portion of the stomach.



Case XI, FIG. 16-a.

- A. Greatly dilated stomach, extending to symphysis pubis.
- B. Angulation at pylorus.
- C. Site of gastroenterostomy.

